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ABSTRACT

This study addresses the question: Is the verbal interaction between teachers and students reciprocal? Teachers' and students' verbal behaviors were investigated using the verbal behavior classification system (CVC) in 72 seventh through ninth grade classrooms. The CVC system consists of a matrix of process and substance dimensions. Categories in the process dimension are: (1) seek; (2) inform; (3) accept; and (4) reject. Categories in the substance dimension are: (1) cognition-memory; (2) productive-critical thinking; (3) expressed emotion; and (4) class management. A stepwise regression analysis of results indicated that teachers' cognition, productive-critical thinking, emotion, management, and seek behaviors were directly predictable from the corresponding pupil behaviors. Verbal interaction reciprocity emerged in three of the process categories in such a way that teachers' inform and accept behaviors were dependent upon pupils' seek behaviors, and teachers' reject verbalizations were dependent upon pupils' inform verbalizations. An analysis of findings suggests that the process dimension of interaction is not as directly and reciprocally dependent as the substance dimension. The findings support the contention that the nature and type of pupil verbal behavior has similar and concomitant effects on the behavior of the teacher. A previous study on this topic concluded that the quality and type of intellectual climate are generally dependent on the quality and type of teachers' intellectual input. This study extends this conclusion in that the quality and type of intellectual climate are generally dependent upon the quality and type of intellectual input of both the teachers and their students. (Author/JD)

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Reciprocity of Verbal Interaction of Teachers and their Students[1]

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Abstract

Teachers' and students' verbal behaviours were investigated using the CVC system of classification in 72 classrooms of grades 7, 8, and 9 in a rural and an urban school system. Trained observers observed classes during instruction in language arts, social studies, mathematics, and science twice during two weeks. The stepwise regression analysis results indicated that teachers' cognition, critical production thinking, emotion, management, and seek were directly predictable from the corresponding pupil categories. Such verbal interaction reciprocity emerged in three of the process categories in such a way that teachers' inform and accept behaviours were both dependent on pupils' seek behaviours and that teachers' reject verbalizations were dependent on pupils' inform. Canonical correlation analysis of teachers' and pupils' substance marginals percentages produced two high and significant correlations whereas the process marginals produced only one significant correlation. Results extended and related to the theory of instruction and behaviour management.

Reciprocity of Verbal Interaction of Teachers and Their Students

Numerous category schemes have been proposed to study in natural settings the complex, dynamic, and interactive qualities of the teaching-learning system. In a number of research studies which used observation category systems, the focus was the correlation of student achievement with various behavioral categories of teachers (see Rosenshine, 1971). The results of such investigations are equivocal and it is hard, therefore, to generalize from the reivew of literature in this area. In fact, Rosenshine and Furst (1973), in a chapter on the use of direct observation to study teaching, concluded with grim pessimism on the state of art in this particular mold. Randhawa (1980) reported a study which attempted to take into account the shortcomings of other studies involving interactive observations and analysis and concluded that the nature and type of pupil verbal behavior in the classroom have similar and concomitant effects on the behavior of the teacher. This particular study involved the observation of verbal behavior of teachers and pupils in grades 4, 5, and 6. The present study was designed to determine whether the results of Randhawa (1980) can be generalized in grades 7, 8, and 9. Specifically, the present study addressed the question: Is the verbal interaction of teachers and their students reciprocal?

Method

Observation Instrument. The verbal behavior classification system (CVC) developed by the Co-operative Educational Research Laboratory,

Incorporated (1969) was used for data collection. The CVC system consists of a 4 x 4 matrix of process and substance dimensions. Categories in the process dimension are seek (S), inform (I), accept (A), and reject (Rt). Categories in the substance dimension are cognition-memory (C), productive-critical thinking (T), expressed emotion (E), and class management (M).

This instrument was selected because (a) it provides desired information on cognitive, affective, and management aspects of the classroom on the substance dimension; (b) its process dimension includes categories shown to be important and significant from the previous research; (d) it is an observation system that represents a synthesis/modification of a number of well known systems (Simon & Boyer, 1970) which have been used extensively in reserch on teaching; and (d) it can be used for categorizing the verbal behaviours of teachers and, if desired, of their pupils as well.

Training of Observers. The manual and the training procedures were exactly those used by Randhawa (1980). The manual for the CVC system for training observers was modified to include examples of the 16 cells of the matrix separately just before the section on combinations of process and substance categories. Also, verbal interaction simulations on a video-tape and script were prepared for use in the training workshop.

Three trainers and 16 potential observers took part in the training workshop. The training workshop was conducted for about 40 hours in one week from Monday to Friday.

The training consisted of instruction and study of the modified CVC manual, practice in the recording of observations using the simulated script and video-tape, and also actual recording in the classrooms in an

elementary school. Training with the manual and simulated materials provided immediate effective feedback and a group discussion on the observation process followed. By the end of the workshop the trainees had reached the proficiency level of at least 95 per cent consistency. Twelve of the 16 trained observers were selected voluntarily for participation as observers in the study. The remaining four trained observers were available as substitutes if needed but such a contingency did never occur.

Data Collection. The Monday following the training workshop, each observer started data collection in the selected classes. Each selected teacher of a specific subject waas observed only once each week, each time by a different observer. The record of observations was prepared from the beginning to the conclusion of the lesson. This was considered essential in the present study because the type of interaction that takes place during different phases of the lesson varies (Randhawa, 1980).

Each observer observed two or three lessons a day for a period of two weeks. An observer recorded in the supplied forms the cell symbols of the CVC matrix for the teacher utterances but for the pupils' utterances these symbols were underscored. Also, the observer audio-taped the verbal interaction in a specific classroom. The observer recorded a new classification every time there was (a) a change in process or substance in a communication or an interaction; (b) a change in speaker; and (c) a new sentence. If none of the above changes occurred in a communication or interaction, the observer recorded every six seconds the repeated category of the CVC.

The frequency of occurrence of each cell subcategory of the CVC matrix was obtained for each teacher and her pupils from each record. For the purposes of the present study, the cell frequencies of the two records of a

teacher and her pupils were combined and converted into percentages separately. This was necessary because the time of observation was different for different classrooms and for two lessons of the same teacher in the same classroom.

Sample. Data were collected in language arts, mathematics, science

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Insert Table 1 about here.

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and social studies classes of grade 7, 8, and 9 from a rural and an urban school system. A total of 72 classrooms were observed. The cell frequencies are given in Table 1.

Analysis and Results

The stepwise regression analysis procedure using dummy variables for entering the nominal variables (grade, locale, and curriculum) as predictors was used to determine the best predictors for predicting the teacher verbal categories. The primary interest of the present study was to predict each of the teacher marginal substance and process categories from the corresponding set of four substance and process marginals of students along with the dummy variables as predictor sets. It was considered pedagogically interesting to predict the questioning and the higher level critical thinking verbalizations of teachers. Also, it seemed important to predict the discipline-related verbalizations of teachers because of the recent concern of educators and general public.

Therefore, four of the 16 CVC cell percentages, seek cognition (questioning), seek critical thinking (questioning), inform critical thinking, and reject management (discipline-related) of teachers were

selected as dependent variables of special interest. Each of these dependent variables were entered in the stepwise regression analysis with the predictor set of 16 CVC cell percentages of students along with the dummy variables identified above.

Since the substance and process marginal percentages and the cell percentages involved in the dependent and predictor variable sets are intercorrelated among themselves, it was decided to extend the question of prediction with the question: How many significant orthogonal dimensions of relationship account for the inter-relationships among the dependent and predictor variable sets and what are the magnitudes of these relationships? These questions were answered using canonical correlation analysis.

As expected, in predicting each of the four dependent variables in the substance dimension the worthwhile set of predictors in every instance included that particular substance variable for the students. A predictor variable was considered worthwhile if it produced a significant ($p < .05$) sequential F-ratio when it was entered into the regression equation at a particular step and/or it did not debilitate the worthwhileness of a predictor already in the regression equation.

The two optimal predictors of teacher cognition utterances were the language arts dummy variable and the pupil cognition. These two predictors produced $R = .78$ and $R^2 = .60$. The only predictor of the teacher critical thinking was student critical thinking with $R = .86$ and the corresponding $R^2 = .74$.

A substantial 21.4% of teachers' E was predictable by the pupil M and E. The corresponding R was .46. The teacher M was substantially predictable with $R^2 = .65$ and $R = .81$ with the predictor set of the pupil M and the curriculum area and grade level dummy variables.

In the process marginals only S of teachers was directly predictable from the corresponding pupil S such that R and R^2 were .44 and .19 respectively. Adding one of the subject dummy variables increased R and R^2 to .49 and .24 respectively. However, the other process marginals indicated the reciprocity of verbal interaction in the sense that the only significant predictor of the teacher I was the pupil S with R = .47 and R^2 = .23. Similarly, the teacher A was optimally predictable by the pupil S with R = .47 and R^2 = .22. The teacher Reject was significantly dependent on the locale dummy variable and the pupil I with R = .49 and R^2 = .24.

The teacher SC and ST were significantly predictable by the pupil IC and IT respectively. The variance accounted for in the above was 31.4% and 78.8% respectively. If teachers asked questions at a certain cognitive level, the pupils responded in the same cognitive level with a high probability. This was more likely the case at the higher critical thinking level. For the prediction of teachers' IT, the optimal set of predictors was the four cells pertaining to thinking. This set of predictors produced R = .71 and R^2 = .51. Teachers' verbalizations disapproving pupils' verbal and behavioural management manifestations (RtM), was significantly predictable by the pupil RtM, locale, curriculum area, IC and SE. This predictor set produced R = .86 and R^2 = .74.

In the canonical correlation analysis of substance marginals of teachers and pupils the M category was not entered because of linear dependence. Matrices of weights and related statistics for this analysis are reported in Table 2. Using the three variables in each set produced

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Insert Table 2 about here.

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two significant canonical correlations .88 and .76. The first linear combination reflected the major emphasis of T in each set. The second set of weights likewise showed the substantial contribution of C.

Matrices of weights and related statistics for canonical correlation analysis of process categories are given in Table 3. As in the previous

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Insert Table 3 about here.

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analysis, Accept category was not included in each set because of linear dependence. Only one significant canonical correlation (.64), which is indicative of linear weightings shown in each set, was obtained. Generally, these results suggest that a substantial amount of verbal discourse centered around Seek and Inform.

The findings reported above generally support the contention that the nature and type of pupil verbal behaviour in the classroom has similar and concomitant effect on the behaviour of the teacher.

Discussion

In a recent study involving grades 4, 5, and 6 classes, Randhawa (1980) reported three significant canonical correlations (.92, .69, and .56) for the percentages of substance marginals of teachers and pupils. These three correlations were produced by three orthogonal linear composites of teachers' and pupils' percentages on Cognition, Thinking, and Emotion and reflected in each case a substantial weight in the two sets on only one variable, Thinking, Cognition, and Emotion respectively. However, in the present study only two significant canonical correlations (.88 and .76) were obtained which showed in each set of variables a major emphasis

on Thinking and Cognition respectively. Since Emotion was not substantially weighted in the first two linear composites and the third canonical correlation did not reach significance as it was very low (.13), it might mean that in grades 7, 8, and 9 Emotional related exchanges of teachers and pupils are not as paramount as in grades 4, 5, and 6. In fact, the regression analysis indicated that emotional verbalizations of teachers were significantly more predictable by their pupils' verbalizations concerning management than those concerning emotion.

In the same study Randhawa (1980) reported two significant canonical correlations (.55 and .40) for the data on process marginals. Grades 7, 8, and 9 data produced only one significant canonical correlation (.64). The weights for the two sets of variables, however, indicate a rather non-systemtic emphasis on the three variables involved. This might suggest that the process dimension of interaction is not as directly and reciprocially dependent as the substance dimension. In fact, had it been the case that the process dimension was also consistently dependent on the specific elements of the process, then the interpretation of verbal interaction in these classes would have shown unexpected progression of verbal discourse. The process dimension of teacher-pupil interaction in this study as well as in the Randhawa (1980) study showed that interaction was in conformity with the accepted principles of communication in that the questions were answered, the answers were accepted as right or wrong or more information was sought by means of another question, and during the process of answering or supplying information pupils or the teacher asked questions to clarify the discourse. The above analysis was confirmed in the regression analysis of SC and ST, the two cells pertaining to seeking factual information and obtaining reasoning or explanation.

The results of the substance dimension confirmed what Gallagher (1970) reported. He concluded that the quality and type of intellectual climate are generally dependent on the quality and type of teachers' intellectual input. This study extends this conclusion in that the quality and type of intellectual climate are generally dependent upon the quality and type of intellectual input of both teachers' and their students.

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TABLE 1

Cell frequencies of classrooms

Subject	Grade 7	Grade 8	Grade 9	Total
Rural				
Language Arts	5	5	4	14
Social Studies	5	5	5	15
Science	5	5	5	15
Mathematics	5	5	5	15
	20	20	19	59
Urban				
Language Arts	2		2	6
Social Studies	1	1	1	3
Science	0	1	0	1
Mathematics	1	1	1	3
	4	5	4	13
Total	24	25	23	72

TABLE 2

Matrices of weights and related statistics for canonical correlation analysis of teacher and student substance categories

Variable	Teacher		Student	
	X_1	X_2	Y_1	Y_2
Cognition	-0.34	0.98	-0.33	1.16
Thinking	-1.10	0.13	-1.12	0.35
Emotion	0.10	-0.21	0.12	0.04

Number	Eigenvalue	r_c	Wilk's λ	χ^2	df	p
1	0.77	0.88	0.10	158.60	9	0.00
2	0.58	0.76	0.41	60.14	4	0.00
3	0.02	0.13	0.98	1.22	1	0.27

TABLE 3

Matrices of weights and related statistics for canonical correlation analysis of teacher and students process categories

Variable	Teacher X_1	Student Y_2
Seek	1.04	1.77
Inform	1.77	0.94
Reject	0.90	0.38

Number	Eigenvalue	r_c	Wilk's λ	X^2	df	p
1	0.41	0.64	0.55	40.16	9	0.00
2	0.07	0.27	0.93	4.94	4	0.29
3	0.00	0.01	0.10	0.01	1	0.94